

Waste Minimization in Action: Dry Cleaning Bulletin

Inside:

Dry Cleaning
Checklist, page
4.



Table of Dry
Cleaning
Options,
page 3.

Table of Hazardous Waste Minimization Practices		
Dry Cleaning	Auto Maintenance	Auto Maintenance
Closed-Loop Systems	Non-Ignitable Solvents	Antifreeze Recycling



BENJAMIN J. CAYETANO,
Governor

LAWRENCE MIIKE,
Director of Health

Many of the clothes we wear require us to use dry cleaners. In Hawai'i, approximately 40 dry cleaning companies have about 90 shops in the state. They, like many businesses, have environmental regulations to follow because of the materials they use in their process. Dry cleaning employs solvent solutions to dissolve grease and lift stains out of cloth that cannot be washed in water and detergent. Many of the solvent solutions yield wastes that may be hazardous. There have been recent changes in the industry to reduce the impact of these solvents on the environment. This article will detail some of the ways that dry cleaning businesses can reduce their wastes and emissions to the environment. It also contains a CHECKLIST (page 4) to help dry cleaners ensure that they are doing their best to protect Hawai'i's delicate environment. Additional assistance on waste minimization and regulations can be obtained through the Department of Health's Solid & Hazardous Waste Branch (586-4226).

CHANGING REQUIREMENTS

In the last year, dry cleaners have had many new issues to address: Clean Air Act Amendments (CAAA) specifying new requirements for dry cleaners, wastewater concerns that may soon result in additional federal and state requirements for wastewater disposal, and changes in the worker safety exposure level of solvents used in the industry.

In addition to this, dry cleaners, depending on their size, are regulated as

hazardous waste generators. In Hawai'i, these regulations are contained in Hawai'i Administrative Rules (HAR) 11-260 to 280, promulgated on June 18, 1994. [*The Hawai'i regulations, as they apply to dry cleaners, are essentially the same as the federal regulations previously in place in Hawai'i (40 Code of Federal Regulations Parts 260 to 270).*] The primary reason for regulation under hazardous waste laws is the use of perchloroethylene or PERC (aka, tetrachloroethylene, tetrachloroethene, and PEC). PERC is considered a hazardous waste in two categories: as a listed waste (F002) and as a characteristic (toxic) waste (D039; regulated at concentrations of 0.7 ppm and above). Some by-products of the dry cleaning process, such as spent filters and sludges, may also be regulated as hazardous waste because they have toxic concentrations of PERC or are derived from PERC.

MANAGEMENT

Waste minimization often requires changes in a business. To make change, management support and assistance is usually required to ensure the change is appropriate and will be carried out consistently in the organization. A management style consistent with implementing waste minimization and better environmental regulatory compliance is Total Quality Management. In this, the workers are actively involved in identifying, implementing, and measuring solutions to specific problems. Additional

Waste Minimization in Action:

Dry Cleaning Bulletin

support for waste minimization can be achieved through training of employees to ensure they know required safety and environmental regulations and responsibilities, and training in the maintenance and use of complex equipment to ensure the safest and most efficient use.

Information required to measure success of waste minimization activities includes a tracking system for all materials and wastes, and full accounting for waste disposal costs. This information can often be gathered by conducting a waste audit at the business.

An additional role of management is to weigh the costs and benefits of any changes being considered, gather information on payback periods for any equipment that may be purchased, and make decisions for what to try and what not to try. The following sections of this article outline various options for waste minimization. They are not being presented as requirements, but as possibilities.

SOLVENTS

PERC is a suspected carcinogen and contributes to air pollution (photochemical smog). It is regulated under Clean Air, Hazardous Waste, and Occupational Safety and Health regulations. It is also a superior solvent for dry cleaning purposes and is nonflammable, which accounts for its popularity. Other solvents exist to substitute for PERC, but most also have problems associated with air pollution, health, and additionally, fire hazards. TABLE 1

(page 3) identifies some alternatives and lists advantages and disadvantages of each. Substituting one solvent for another does not necessarily constitute waste minimization, but may yield benefits in cost savings especially as regulations affecting the use of PERC become more stringent.

OPERATIONS

Better operations include maintenance and spill detection activities that are now required under the new Clean Air Act Amendments. Many of the activities do not require cash inputs, but do involve staff time, such as cleaning lint screens to avoid clogging fans and condensers, and opening button traps and lint gaskets only long enough to clean them. Other possibilities, such as redistilling still bottoms and using a cartridge stripper to remove additional solvent, can involve both time and money. The goal of better operations is to focus on activities that maintain efficiency in dry cleaning equipment, and also reduce emissions of solvents. This reduces worker health and air pollution impacts, and enables a business to reduce the amount of solvent inputs into the dry cleaning unit.

PROCESSES

Changes to processes include the most expensive possibilities for waste minimization, and can yield the most dramatic results. Major process changes include 1) replacing transfer or dry-to-dry vented equipment with new dry-to-dry closed loop equip-

ment; 2) replacing transfer equipment with reconditioned dry-to-dry equipment; or 3) converting dry-to-dry vented machines to closed loop machines. Case studies for each of the above situations show PERC savings as high as 80 percent, and pay back periods as short as 3 years in some cases (Wolf, 1992).

Emission controls can be incorporated into both transfer and dry-to-dry machines. Carbon adsorption can be used with dry-to-dry and transfer machines, and can reduce emissions up to 95 percent. A disadvantage of carbon adsorption is the generation of large quantities of wastewater which may be hazardous waste. Refrigerated condensers can help reduce 85 percent of emissions in transfer machines, and 95 percent of emissions in dry-to-dry machines. They may be more cost effective than carbon adsorption and do not yield high wastewater outputs. Disadvantages include inability to capture solvents from low concentration air streams, and increase in drying time.

Additional process changes could include installation of leak detection equipment, use of a disc filtration system in place of canister filters, and purchase of a filtration/distillation unit to recycle solvents in-house. All of these can assist in reducing emissions and/or waste generation, but have associated costs that must be balanced against the benefits the business might receive.

Other methods of cleaning that do not require solvents, such as low temperature laundering, are beginning to receive more attention. Research may soon produce viable alternatives to the present dry cleaning methods.

Waste Minimization in Action:

Dry Cleaning Bulletin

Table 1: Summary of Solvent Alternatives for Dry Cleaning

Alternative Solvent	Advantages	Disadvantages
Stoddard Solvent	Cleaning ability similar to PERC. Widely available.	Requires use of explosion proof equipment. Use may be prohibited by local fire department. Solvent contributes to photochemical smog.
140F Solvent	Cleaning ability similar to PERC. Less flammable than Stoddard solvent.	Same disadvantages as Stoddard solvent and longer drying time.
TCA	Low cost, widely available, and non-flammable.	May be too aggressive for some cleaning applications. Pure TCA is unstable and requires use of stainless steel equipment. On-site recovery may remove stabilizers. Moderate ozone depletion; phased out by year 2005.
HCFC's & Other CFC's	Not likely to contribute to photochemical smog. Good cleaning ability expected and stable.	Ozone depletion potential present. Limited data on toxicity. High loss due to low boiling point. Expensive and unavailable - interim solution.

SOURCE: Jacobs Engineering Group Inc. No date. Source Reduction and Recycling of Halogenated Solvents in the Dry Cleaning Industry. See complete reference, page 3.

At present, however, the alternative methods are not within the reach of most small to medium size dry cleaning businesses.

ADDITIONAL RESOURCES

Assistance in identifying options for improving a dry cleaners practices, and achieving waste minimization and the environmental and health related benefits, is available from the Department of Health Waste Minimization Program (586-4226). Manufacturers and distributors of dry cleaning equipment can also serve as valuable resources for detailed information on upgrading or

changing equipment. The sources for this article (see REFERENCES, below) also contained detailed information on options for dry cleaners and associated benefits and costs.

REFERENCES

References are available at the Waste Minimization Library, Solid & Hazardous Waste Branch Office (see page 8 for address and materials request form):

County Sanitation Districts of Los Angeles County. September 1990. Dry Cleaning Industry:

Pollution Prevention Opportunities Checklist. CSDLA, Whittier, CA.

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Wolf, Katy. 1992. "Case Study: Pollution Prevention in the Dry Cleaning Industry: A Small Business Challenge for the 1990s. Pollution Prevention Review, Summer 1992. pp. 311-330. *This article is reprinted from the Hazardous Waste Minimization News, Volume 3, Number 1, September, 1994, a periodic newsletter written and distributed by the Department of Health, Solid and Hazardous Waste Branch. For more information, please call the Waste Minimization Coordinator, 586-4226.)*

Waste Minimization in Action:

Dry Cleaning Checklist

MANAGEMENT PRACTICES:

Management support for waste minimization is very important. These techniques can be used by managers to promote waste minimization at all levels of a business's operations.

- ___ Develop a company policy to reduce hazardous waste, and initiate an employee recognition program to encourage new ideas for reducing waste.
- ___ Initiate employee training in conservation of hazardous materials and minimization and proper handling of hazardous wastes.
- ___ Track hazardous materials purchases, use and waste generation.
- ___ Account for the full costs of handling and disposing of hazardous wastes.
- ___ Conduct a waste audit to identify opportunities for minimizing waste.

BETTER OPERATING PROCEDURES:

Businesses can minimize waste by improving their handling of hazardous materials and managing their waste properly. These techniques often do not require an investment in new equipment or materials, but can result in substantial waste minimization and cost savings if employees are encouraged and dedicated to following them.

- ___ Keep solvent containers closed while not in use.
- ___ Label all raw material containers.
- ___ Replace seals regularly on dryer deodorizer and aeration valves.
- ___ Replace door gasket on button trap and gaskets around cleaning machine door.
- ___ Repair holes in air and exhaust ducts.
- ___ Secure hose connection and couplings.
- ___ Clean lint screens to avoid clogging fans and condensers.
- ___ Open button traps and lint gaskets only long enough to clean.

- ___ Redistill still bottoms with more water following boil-down.
- ___ Use cartridge stripper to remove solvent from cartridge.
- ___ Do not over- or under-load equipment.

PROCESS MODIFICATIONS:

Some specialized equipment can minimize waste generated in dry cleaning processes. While these techniques can be costly, businesses can save money on material purchases and waste management costs by using them.

- ___ Convert to dry-to-dry machine.
- ___ Purchase reconditioned dry-to-dry closed-loop system.
- ___ Use machines with monitors to control amount of solvent and detergent used, and length of drying cycle.
- ___ Install solvent leak detectors.
- ___ Install disc filtration in place of cannister filters.
- ___ Use refrigeration/condensation emissions control system.
- ___ Steam strip cleaning filter cartridge.
- ___ Explore solvent substitutes for PERC.
- ___ Substitute low temperature laundering or other non dry cleaning technology for dry cleaning for applicable fabrics.

SOLVENT RECLAMATION:

- ___ Contract collection of cartridge filter, separator water and still bottom for off-site reclamation.
- ___ Purchase a filtration/distillation unit to use in-house.